Discount Pricing*

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Abstract

We investigate the practice of framing a price as a discount from an earlier price, with information such as "was $200, now $100". We discuss two reasons why a discounted price—rather than a merely low price—can make a consumer more willing to purchase. First, a high initial price can indicate the seller has chosen to supply a high-quality product. Second, when a seller with limited stock runs a clearance sale, later consumers infer that unsold stock has higher expected quality when its initial price was higher. We also suggest a behavioural explanation, which is that consumers with reference-dependence preferences are more likely to buy if they perceive the price as a bargain relative to the earlier price. Discount pricing is therefore an effective marketing technique, and a seller may wish to deceive potential customers by offering a false discount. The welfare effects of regulation to prevent fictitious pricing are subtle, possible with unintended consequences, partly depending on whether consumers are sophisticated or naive.

Keywords: Reference dependence, sales tactics, false advertising, fictitious pricing, consumer protection.

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1 Introduction

Many consumer prices are expressed as a discount from some price offered earlier. Despite its prevalence, though, this practice of *discount pricing* has apparently received little

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economic analysis.[1] In most models of sales, for instance, consumers care only about the price level, and whether or not a price is labelled as being discounted from some higher price plays no role. Why should a consumer be more likely to buy a jacket priced at $100 accompanied by a sign which reads "50% off the previous price" than he would be if the price were merely stated as $100?

In this paper, the phenomenon of discount pricing is explored using the framework we describe in more detail in section 2. A monopolist sells its product over two periods, and consumers are segmented over time and must buy in their own period. Consumers in the second period cannot directly observe the initial price, although the firm can report to them its previous price (for instance, with a sign reading "50% off the previous price"). The firm's environment can differ in two dimensions. First, the legal regime might or might not permit the firm to make false claims about its initial price. Second, consumers might be sophisticated, and ignore unsubstantiated claims about previous prices—that is, they "discount the discount"—or they might be naive and take the firm's claims at face value. Consumer policy interventions might also be organized along these two dimensions. Legal regulation might, if well enforced, act to prevent false discounts. Alternatively, an education campaign might be launched to inform consumers that firms can and often do present misleading claims about their earlier prices.

We describe three ways in which consumers in the second period care about the initial price. First, as discussed in section 2, behavioural consumers might simply care intrinsically about the price that earlier consumers paid, and all else equal a consumer's propensity to buy is greater when the product has been offered to others at a higher price. That is, these consumers like the feeling of "getting a bargain", and this makes them more inclined to purchase.

In section 3 we go on to discuss two reasons why rational consumers will care about an earlier price. These each involve a mechanism whereby less informed consumers in the second period use the initial price as signal of an unobserved characteristic of the product, where a higher initial price indicates the product is more desirable. In section

[1] Table 4.1 in the report by the UK's Competition & Market Authority (2015) indicates that in 2014 at least 8% of (non-alcoholic) products in major supermarkets were included in a reference price promotion at any one time. Section 4 of that report provides more evidence from this sector about the frequency and forms of discount pricing.

3.1, uninformed consumers take the firm's initial price as a signal of its choice of quality. The firm sells its product to two groups of consumers: keen buyers who can accurately determine the product's quality and wish to buy early, and casual buyers who arrive later and cannot directly observe quality. Since the former group will only buy the product at a high price if the quality is high, later buyers use the initial price offered as an indicator of quality. In this framework, the firm has an incentive to supply a higher quality product when it must honestly report its initial price. Thus, the firm's ability to write "was \$200, now \$100", if credible, induces it to supply a better product.

In section 3.2, we study a clearance sale where a seller with limited stock offers its product at a discount in the second period if it has stock left unsold after the first period. The fact that the product did not sell well initially indicates that early consumers did not think the price/quality combination was good value, a form of adverse selection. While the presence of unsold stock is "bad news" about the desirability of the product to later, less informed, consumers, that news is less bad—there is less adverse selection—if the initial price was high, and for this reason later consumers care about the initial price as well as the current price. All else equal, later consumers are more inclined to purchase unsold stock when they think the firm's initial price was high.

If for any of these reasons later consumers care about the initial price, a seller has an incentive to exaggerate its report of its initial price, an important instance of what is often termed fictitious or deceptive pricing.[2] The media regularly features stories in which a firm's claimed discounts are alleged to be fictitious. For instance, a supermarket's heavily advertised 15% average price reduction may have been preceded by an unadvertised gradual price rise cancelling out the reduction, or a retailer may market its stock at prices which are permanently "70% off".[3] If consumers are sophisticated and know that firms are able to misrepresent their earlier price without penalty, they will simply regard claimed price reductions as puffery and pay them no attention. The result is that a potentially useful channel of communication is shut down. In the models presented below, the firm would *welcome* a policy which forces it to report initial prices honestly as this enables it to

[2] Other forms of fictitious or deceptive pricing include claims that a price is below other prices currently available, either in other outlets of the same seller or from other sellers, or that the free gift which accompanies a purchase has an exaggerated value.

[3] See Harkrader (1962) for a long list of such "dodges".

credibly communicate its initial price to later consumers. However, if instead consumers are naive and believe a firm's false claims, these consumers may be induced to pay more for the product than they would otherwise. In our models below, the firm in this case is harmed if it is required to report its initial price honestly. Changing the regulatory regime to prevent fictitious pricing has less clear-cut effects on overall welfare. In the model in section 3.1, the policy change will induce the firm to increase its initial price and its product quality, and this is good for welfare. In section 3.2, though, the firm cannot affect quality and the policy will merely increase the initial price which will harm welfare.

There are a number of earlier contributions which discuss issues related to our models. Ngwe (2018) documents the use of discount pricing, both real and fake, by a US clothing retailer. The retailer offers its products both in city-centre "regular" stores which typically do not offer discounts, and out-of-town "outlet" stores which do. The retailer offers two classes of product: "original" products which are available first in the regular stores and then at a discount in the outlet stores, and "factory" products which are only available in the outlet stores. The discounts offered on original products are genuine, in the sense that the products were initially available at full price in the regular stores, while the discounts on factory products are arguably fake, since the products have not been offered for sale at the notional "list price". (Figure 3 in his paper shows a typical factory product with a list price of \$275, where there is not actual sale of the product at a price above \$200.) Fake list prices appear to have a significant impact on demand for factory products, and Ngwe estimates that a \$1 increase in the notional list price has the same impact on purchase likelihood as a 77c decrease in the actual price.

Reference dependence came to prominence with the work of Kahneman and Tversky (1979) and Thaler (1985), and is now the subject of a vast literature in economics.[4] Consumers can be loss-averse—that is, they care more about avoiding losses than they do about

[4]See Spiegler (2011, Part Three) for an overview of recent contributions. An early discussion is found in Scitovsky (1944, page 101): "price competition usually takes the form of the seller trying to introduce into the buyer's consciousness two distinct prices [...] One of them is the price to be paid for the commodity, the other is the price which is to indicate its worth. The sale of "Fifty Shilling Clothes" at thirty-five shillings before the war, or of "dollar watches" at eighty-nine cents in America, are examples of this practice. Further examples are the granting of special discounts; and special sales at reduced prices, where both the old and the new reduced price are marked on the price tag and the consumer judges the cheapness of the bargain by the difference between the two prices."

obtaining the same sized gains—or they might be bargain-loving and experience pleasure from extracting a bargain from a seller.[5] In our simple model in section 2, all that matters is that a consumer's propensity to buy increases if the reference price—in our context, the initial price—increases. One implication of Thaler's theory is that firms might profit from a high "suggested retail price", which serves as a reference price, and a price discounted from this suggested price may provide consumers with a "transaction utility". Evidence that consumers incorporate previous prices into their reference price is discussed by Kalyanaram and Winer (1995). They suggest that the plausibility of this method of reference price formation is called into question by the observation in surveys that many consumers cannot recall previous prices of a particular good; however, this problem is overcome if the current price is explicitly framed as a discount from a previous price, so that the firm itself recalls the earlier price.

Section 3.1 presents a model where the firm's initial price reflects the firm's chosen quality to later, less expert, consumers. The initial price is informative since early consumers are well informed, and would not purchase unless the chosen quality was high enough to merit the high price. A very different mechanism operates in Bagwell and Riordan (1991), who study a model where a firm has private information about the exogenous quality of its product and attempts to signal its quality with its price. In contrast to our model, they assume later buyers are *more* likely to be informed about quality (for instance, by reading consumer reports which appear after the product's launch). They find that high and declining prices signal high product quality: the firm distorts its price above the full-information level in order to signal high quality, and, as more consumers become informed, there is less price distortion in later periods. While their insights are derived mainly in a setting where the firm's current price signals quality, they consider an extension where later consumers can observe the firm's past price. In this case, the firm's prices may be more distorted in period 1 but less distorted in period 2, compared to when past price

[5] In Emile Zola's *The Ladies' Paradise*, the owner of the eponymous department store "had discovered that she [the consumer] could not resist a bargain, that she bought things without needing them if she thought she was getting them cheaply; and on this observation he based his system of price reductions". (Émile Zola, *The Ladies' Paradise*, trans. Brian Nelson, Oxford University Press, 2008, page 235.) Harkrader (1962, page 1) quotes a corporate submission to the FTC: "Everyone loves, and hopes to find, bargains. It is this universal human trait that is exploited by the practice of fictitious pricing, whatever its form."

is not observed, and they find that the high-quality firm has an incentive to reveal past price information to uninformed consumers. Thus, when a firm makes sequential sales of a product, the exogenous quality of which is the firm's private information, a policy that bans false discounts could boost profit.

Our model in section 3.2, where a firm's initial price affects the pool of qualities available in the second period, modifies Lazear's (1986) model of clearance sales so that later consumers cannot observe the product's quality. Lazear's basic model supposes that a firm has a single item to sell over two periods, and there is a single consumer present in each period. The two consumers have the same valuation for the product, but the firm does not know this common valuation. If the item remains unsold after the first period, the firm infers that this valuation is below its initial price, and so offers a discount to the second consumer. In Lazear's model, the second consumer has no interest in the firm's initial price, and she will buy whenever the sale price is below her valuation. In our model, by contrast, the second consumer does not observe quality directly and—like the firm itself—infers expected quality from the observation that the product did not sell initially.

Taylor (1999) also modifies Lazear's model so that later consumers care about the initial price. He studies how best to sell a house when distinct pools of buyers arrive over two periods. The seller knows the quality of the house (about which buyers obtain a noisy signal), while buyers have idiosyncratic tastes for the house conditional on its quality. If the house remains unsold after the first period, the seller adjusts his reservation price for the second period. The house does not sell in the first period if (a) no buyer was present, (b) all buyers had negative signals about the house's quality, or (c) all buyers had valuations below the asking price. Similar to our mechanism in section 3.2, when the seller sets a high initial price which is observed by later buyers, this makes (c) a relatively more likely explanation, and a later buyer's belief about quality is less adversely affected. Also related is Bose *et al.* (2006), who study a market where a monopolist supplies a product with uncertain quality, and consumers arrive sequentially and decide whether to purchase the item on the basis of their own private signal of quality and the history of previous purchase and price decisions. They investigate the monopolist's choice of prices over time. The firm is keen to avoid consumer pessimism about quality, and one way to do this is to charge high prices initially so that later consumers infer that an earlier decision not to purchase

is less likely to be due to observing a negative private signal of quality.

Debo and van Ryzin (2013) study a two-period model with a similar flavour to ours in section 3. A firm supplies a product of uncertain quality which is known to the firm and (imperfectly) known to the early consumers, while later consumers cannot observe quality directly. The volume of both early and late buyers is uncertain, and the firm has choose its inventory for each period at the start of the period before demand is realized. Later buyers observe the initial price and whether or not the product sold out in the first period (eg., due to media coverage of "buying frenzies"), but do not observe demand volume or inventory levels. The authors show that the firm might strategically under-invest in initial inventory (relative to the alternative situation where later buyers do not observe whether there is a stock out) in order to make a stock-out more likely, which the later, uninformed, buyers take to be a signal of product quality.[6]

While our paper discusses deceptive claims about earlier prices (which can operate indirectly to inflate a consumer's estimate of product quality), a firm might also make exaggerated claims about its product's quality directly. A recent paper on this topic, which also summarises earlier papers on a similar theme, is Rhodes and Wilson (2018). They study a single-period model where a monopolist has private information about its exogenous quality, where higher quality (if known by consumers) acts to shift the inverse demand curve upwards. The firm can make claims about its quality, and a regulator can costlessly evaluate such claims (after consumers have made their purchases) and levy a specified fine if the firm makes a false claim. If the regulator levies no fine, all types of firm will claim to offer high quality and communication is shut down, while if the fine is large enough the firm will make truthful claims. However, they show there are cases depending on the shape of the demand curve where it is socially optimal to levy an intermediate fine which induces low quality firms to sometimes make false claims: false claims can counteract market power by making consumers more pessimistic about quality and inducing the firm

[6] Miklós-Thal and Zhang (2013) study a related model where a monopolist with uncertain and exogenous product quality sells over two periods to segmented consumers who can buy only in their period. All consumers have a private signal of quality, and later consumers also observe the seller's sales, price and marketing effort in the first period. Here, marketing effort influences the number of consumers who know about the product in the first period. The authors show that the firm might deliberately choose a low marketing effort in order to make later consumers infer that high initial sales are more due to high quality than the presence of a large pool of potential consumers.

to reduce its price.

2 A Framework for Analysis

Consider a situation where a monopolist sells its product over two periods, with price p_1 in the first period and price p_2 in the second. Consumers in the two periods comprise distinct groups and can buy only in their own period, and second-period consumers do not directly observe the firm's initial price. Nevertheless, in the second period the firm can report its initial price, for instance by framing its current price as "50% off" the initial price. We assume the second-period consumers care about the firm's choice of initial price. As explored in sections 3.1 and 3.2, this might be because they are uninformed about an aspect of the product, and the initial price reflects this unobserved attribute. Alternatively, consumers might simply have reference-dependent preferences and intrinsically care about the deal they obtain relative to consumers in the earlier period. In the situations we study, period-1 consumers do not care about the subsequent price. Because of this, it is not relevant for our analysis whether or not the firm can commit to its period-2 price in the first period.

The firm's regulatory environment may take one of two forms: a *laissez-faire* regime, where the firm is free to make any claims about its initial price to period-2 consumers, and an *honest* regime, where any report it makes of its initial price is required to be truthful. In the specific models which follow, in the honest regime the firm will always report its initial price to period-2 consumers rather than remain silent. In a *laissez-faire* regime, second-period consumers might be *sophisticated*, so that they accurately forecast the firm's equilibrium choice of initial price and ignore any claims it makes about its initial price. Sophisticated consumers recognize that the firm may have an incentive to exaggerate its reported previous price. Alternatively, second-period consumers might be *naive* and believe the firm's claim about its initial price. Specifically, we assume that naive consumers mistakenly believe that regulation is in place to ensure honest reporting from the firm.[7] As

[7] As Nelson (1974, page 749) puts it, "Consumers are unlikely to be legal experts. Some, therefore, are likely to believe that certain forms of deceptive advertising are prevented by law when, in fact, they are not." In their experimental study of how consumers react to advertised reference prices (ARPs), Urbany *et al.* (1988, page 108) observe that "one reason consumers may judge ARPs believable, even exaggerated ones, is that they believe it is illegal to exaggerate references prices and that the law is strictly enforced."

such, we assume that a naive consumer makes the same inferences from the firm's (possibly misleading) report as does a consumer in the honest regime. In particular, in the honest regime there is no distinction between the two kinds of consumer.

In sum we study three market environments: (i) an honest regulatory regime; (ii) a *laissez-faire* regulatory regime where consumers are sophisticated, and (iii) a *laissez-faire* regulatory regime where consumers are naive. Since the firm's pricing policy is least constrained in environment (iii), and most constrained in environment (ii), the following result is immediate:

Proposition 1 *Among the three market environments, the monopolist obtains the most profit when there is a laissez-faire regulatory regime and consumers are naive, and obtains the least profit when there is a laissez-faire regulatory regime and consumers are sophisticated.*

Therefore, when consumers are sophisticated, the seller would *welcome* a policy which requires it to report its initial price accurately. Such a policy opens up a channel of communication from the firm to its consumers, which will boost its profit. Conversely, in this framework if the seller protests against a proposed introduction of an honest regime it considers consumers to be naive.

This discussion implicitly assumes that in the second period the seller must report its initial price to consumers. In practice, of course, sellers need not report their earlier prices. When the seller makes no report, we assume that period-2 consumers, regardless of sophistication, accurately forecast the firm's equilibrium choice of initial price.[8] Thus, when the seller does not report its initial price the outcome is as in environment (ii) above. Since, as in Proposition 1, this yields the lowest profit to the seller, we can deduce that the seller *will* choose to report its initial price to period-2 consumers.

In more detail, we study situations in which the firm's total profit takes the form

$$\Pi = \pi_1(p_1) + \pi_2(p_1, p_1^e) \ , \tag{1}$$

where π_1 is its profit in the first period when its initial price is p_1, and π_2 is its (maximum) profit in the second period when it chooses the initial price p_1 but second-period consumers

[8] That is, the sole source of naivete is that consumer mistakenly believe the firm is constrained to report honestly.

believe it has chosen the initial price p_1^e. (Section 3 presents some microfoundations for this reduced-form profit expression.) Here, π_1 is single-peaked in p_1, while π_2 weakly increases with both p_1 and p_1^e (at least over the relevant range of initial prices). For instance, if second-period consumers believe high quality is associated with a high initial price, a higher p_1^e will boost their demand and the profit π_2 which can be extracted from them. If the seller has limited stock then when its true initial price is higher, this will leave more stock available to be sold in the second period, and so π_2 increases with p_1 as well.

In environment (i), where $p_1^e \equiv p_1$, the firm chooses its initial price to maximize $\pi_1(p_1) + \pi_2(p_1, p_1)$. In environment (ii), an equilibrium initial price, say p_1^*, is such that

$$\text{setting } p_1 = p_1^* \text{ maximizes } \pi_1(p_1) + \pi_2(p_1, p_1^*) \ .$$

That is to say, the sophisticated consumer anticipates the initial price p_1^*, and given this the firm chooses its initial price to maximize $\pi_1(p_1) + \pi_2(p_1, p_1^*)$ and in equilibrium we have $p_1 = p_1^*$. Finally, in environment (iii) the firm can *choose* p_1^e, and so will choose to report the highest (reasonable) price it might charge in period 1 and then choose its true initial price to maximize (1).

Reference dependence: The most direct illustration of this framework involves a straightforward kind of reference dependence, where the demand from second-period consumers increases with p_1^e, the price these consumers believe that initial consumers paid. (Here, we suppose there are no capacity constraints, and the firm's sales in the first period do not influence its supply in the second period.) In this case, π_2 in (1) is an increasing function of p_1^e and does not depend separately on the true initial price p_1. In the honest regime, the initial price maximizes $\pi_1(p_1) + \pi_2(p_1)$, so that p_1 is above the "myopic" price which maximizes first-period profit $\pi_1(\cdot)$. In a *laissez-faire* regime, however, the firm chooses the myopic price which maximizes $\pi_1(\cdot)$, and so a move to an honest regime will increase the firm's initial price (which therefore harms the period-1 consumers). Intuitively, in order to deliver a "bargain" to period-2 consumers, the firm needs to exploit the period-1 consumers somewhat. (Sophisticated second–period consumers anticipate this myopic price, while naive consumers are told, and believe, that the initial price was high.)

To illustrate, suppose that the seller has costless production, that its first-period demand is $Q_1(p_1) = 1 - p_1$, and its second-period demand when these consumers pay the

price p_2 and believe the initial price was p_1^e is $Q_2(p_1^e, p_2) = 1 + p_1^e - 2p_2$. (This specification is chosen so that when second-period consumers anticipate that the initial consumers paid the same as them, so that $p_1^e = p_2$, their demand takes the same form as that in the first period.) In the honest regime one can show that $p_1 = \frac{5}{7}$ and $p_2 = \frac{3}{7}$, so that the product is offered at a 40% discount in the second period. In the *laissez-faire* regime with a sophisticated consumer we have $p_1 = \frac{1}{2}$ and $p_2 = \frac{3}{8}$. Thus both prices rise if the regulatory regime changes so that the firm must report its initial price accurately. Clearly, the first-period consumers are made worse off with a move to an honest regime. However, if the second-period consumer surplus is evaluated as the "area under the demand curve", so that second-period consumer surplus with prices (p_1, p_2) is $\frac{1}{4}(1 + p_1 - 2p_2)^2$, then this surplus actually increases in the honest regime, despite the period-2 price being higher.[9]

This simple model is reminiscent of Coase's (1972) model of dynamic pricing, but in reverse time. In a two-period version of Coase's model, forward-looking consumers decide when to purchase from the firm. If the firm cannot commit to its second-period price at the start, consumers anticipate the price will fall over time and some of them will wait to buy later. If the firm could commit to its future price—for instance, if public policy somehow forced the firm to "reveal" is second-period price at the start—the result is typically that both prices will rise relative to the no-commitment regime. In the current context, starting from a *laissez-faire* regime with a sophisticated consumer, when policy forces the firm to reveal its initial price this too will typically cause both prices to increase. Policy which prevents fictitious pricing therefore acts as a commitment device to the seller, and enables it to boost its profit.

In the next section we discuss two alternative models which fit into the general framework (1), and which assume a more "standard" form of consumer preferences.

[9] In this framework with reference dependence it is less appealing to study naive consumers. If period-2 consumers believe they are getting a bargain and gain utility from this, should this gain enter into the welfare calculus even when their belief about the initial price is mistaken? It seems unpalatable that the seller is able to boost welfare simply by misrepresenting its initial prices.

3 Two Microfoundations

3.1 Initial price as signal of firm's choice of quality

In this section we modify a simple static model of quality choice so that the firm sells its product over time. Specifically, a monopolist supplies a product over two periods, and chooses its quality *ex ante* which is then fixed for both periods. (One might think of the product as a new phone or other piece of technology.) Quality is a continuous variable, and if the firm chooses quality $q \geq 0$ its fixed cost is $c(q)$, where we suppose that $c(\cdot)$ is increasing and strictly convex and $c(0) = c'(0) = 0$. For simplicity, marginal costs of supply are normalized to zero and there are no capacity constraints.[10]

An exogenous fraction σ of consumers are "keen" and buy in the first period, and the remaining $1 - \sigma$ consumers are "casual" and buy in the second. Keen consumers are enthusiasts and particularly interested in the product: they can discern directly the product's quality, and they are impatient to buy (which is why they buy in the first period). Their valuation is q for the product when its quality is q. Casual buyers cannot directly observe quality, although they attempt to infer quality from the firm's initial price, and their valuation for the product is θq when they believe its quality is q. Here, the parameter $0 \leq \theta \leq 1$ reflects the likely situation where casual buyers have a lower willingness-to-pay for the item. We assume there is no (time) discounting, and the firm weights profit from the two periods equally. In this case the efficient quality level, denoted q^{eff}, maximizes the concave expression $[\sigma + (1 - \sigma)\theta]\, q - c(q)$. Define $\hat{q}$ to be the unique quality which satisfies $\sigma\hat{q} = c(\hat{q})$, so that $\hat{q}$ is the maximum quality which allows the firm to break-even in the hypothetical situation where it faces only the σ period-1 consumers.

A consumer buys the item if the price is no higher than her valuation, which depends on observed (for a period-1 consumer) or estimated (for a period-2 consumer) product quality. (We suppose that if any consumer is indifferent between buying and not buying, she will buy from the firm.) The firm's strategy consists of its choice of quality, its two prices p_1 and p_2, and its report of its initial price to period-2 consumers. In equilibrium the firm's

[10] One could perform a similar exercise where quality choice affected the firm's marginal cost rather than its fixed cost. In that case, one would need to consider whether the firm has an incentive to serve the casual buyers, something which is automatic in the current formulation.

strategy is optimal given consumer buying behaviour and the regulatory constraint to be honest (if applicable), while the expectations of product quality by period-2 consumers, which might depend on observed or reported prices, are consistent with the firm's strategy when those period-2 consumers are sophisticated or when the regulatory regime is honest.

The following result describes how period-2 consumers, regardless of whether they are sophisticated or naive, rationally estimate quality.

Lemma 1 *Suppose period-2 consumers face price p_2 and believe the initial price was p_1^e. Then their unique rational expectation of quality is*

$$\textit{period-2 consumers believe quality is } \begin{cases} q = p_1^e & \textit{if } p_1^e \leq \hat{q} \\ \\ q = 0 & \textit{if } p_1^e > \hat{q} \ . \end{cases} \tag{2}$$

Proof. Suppose period-2 consumers face price p_2 and believe the initial price was p_1^e, and conditional on these prices they expect that quality q^e was chosen. First, note that period-2 consumers buy if and only if $\theta q^e \geq p_2$, and so the firm's profit in the second period is $(1-\sigma)p_2\mathbf{1}(\theta q^e - p_2)$, where $\mathbf{1}(x) = 1$ if $x \geq 0$ and $\mathbf{1}(x) = 0$ if $x < 0$. If the firm chooses quality $q \geq p_1^e$, period-2 consumers believe the initial consumers will buy and that the firm's profit is $\sigma p_1^e - c(q) + (1-\sigma)p_2\mathbf{1}(\theta q^e - p_2)$. Clearly the most profitable quality choice in the range $q \geq p_1^e$ is $q = p_1^e$, in which case the firm makes profit $\sigma p_1^e - c(p_1^e) + (1-\sigma)p_2\mathbf{1}(\theta q^e - p_2)$. On the other hand, if the firm sets $q < p_1^e$ period-2 consumers believe it does not sell to first-period consumers and so makes profit $-c(q) + (1-\sigma)p_2\mathbf{1}(\theta q^e - p_2)$. In the range $q < p_1^e$, the most profitable quality choice is $q = 0$, in which case the firm makes profit $(1-\sigma)p_2\mathbf{1}(\theta q^e - p_2)$. By the definition of $\hat{q}$, the former profit, $\sigma p_1^e - c(p_1^e) + (1-\sigma)p_2\mathbf{1}(\theta q^e - p_2)$, is greater than the latter profit, $(1-\sigma)p_2\mathbf{1}(\theta q^e - p_2)$, if and only if $p_1^e \leq \hat{q}$. As claimed, then, if $p_1^e \leq \hat{q}$ the period-2 consumers anticipate that the firm will choose quality $q = p_1^e$, while if $p_1^e > \hat{q}$ they anticipate it chooses $q = 0$. ■

Intuitively, regardless of whether period-2 consumers choose to buy or not, they calculate that the firm optimally chooses to sell to period-1 consumers if and only if $p_1^e \leq \hat{q}$, and if so to choose quality $q = p_1^e$.

It follows that if period-2 consumers believe the initial price was p_1^e, the firm's maximum

profit in the second period is

$$\pi_2 = \begin{cases} (1-\sigma)\theta p_1^e & \text{if } p_1^e \leq \hat{q} \\ \\ 0 & \text{if } p_1^e > \hat{q} \ . \end{cases}$$

If the true initial price was p_1, the firm's maximum profit in the first period (including the fixed cost) is

$$\pi_1 = \begin{cases} \sigma p_1 - c(p_1) & \text{if } p_1 \leq \hat{q} \\ \\ 0 & \text{if } p_1 > \hat{q} \ . \end{cases}$$

The firm's total profit is then $\pi_1 + \pi_2$ which takes the form (1) where π_2 depends only on p_1^e and not separately on the true price p_1.

Consider first the honest regime where $p_1^e \equiv p_1$, in which case the firm's profit is

$$\pi_1(p_1) + \pi_2(p_1) = \begin{cases} [\sigma + (1-\sigma)\theta]\, p_1 - c(p_1) & \text{if } p_1 \leq \hat{q} \\ \\ 0 & \text{if } p_1 > \hat{q} \ . \end{cases}$$

Since this profit increases with p_1 for $p_1 \leq q^{\text{eff}}$ and thereafter decreases, the firm will choose its initial price and its quality equal to $\min\{\hat{q}, q^{\text{eff}}\}$. If $\hat{q} \geq q^{\text{eff}}$, which is the case when σ is large enough, then the efficient level of quality is achieved in the honest regime. If $\hat{q} \leq q^{\text{eff}}$, the honest regime induces the firm to choose quality $\hat{q}$.[11]

In a *laissez-faire* regime, the firm will choose its initial price and its quality to maximize period-1 profit, $\pi_1(p_1)$. The equilibrium quality, denoted q^{lf}, in this regulatory regime therefore satisfies the first-order condition $c'(q^{\text{lf}}) = \sigma$. Since $q^{\text{lf}} < q^{\text{eff}}$ and $q^{\text{lf}} < \hat{q}$, it follows that $q^{\text{lf}} < \min\{\hat{q}, q^{\text{eff}}\}$, which is the quality chosen in the honest regime. We deduce that equilibrium quality (and initial price) is higher in the honest regime than the *laissez-faire* regime, regardless of the sophistication of the period-2 buyers.

If period-2 consumers are sophisticated, they correctly anticipate the firm's incentives to choose quality, regardless of any claims the firm might make about its initial price, and so $p_1^e = q^{\text{lf}}$. The firm then chooses the second-period price $p_2 = \theta p_1 = \theta q^{\text{lf}}$. If period-2 consumers are naive, though, they believe the firm's claims about its initial price. Since

[11] As discussed in section 2, the seller is better off reporting its initial price to period-2 consumers. (If the firm makes no report of its initial price to period-2 consumers, their unique rational expectation of quality is the *laissez-faire* quality q^{lf} discussed shortly.)

we assume that naive consumers mistakenly think that the firm must report accurately, but are otherwise rational, their belief about quality if the firm announces its initial price was p_1^e is as described in (2). In this case, the optimal strategy of the firm is to choose quality and actual initial price equal to $q = p_1 = q^{\text{lf}}$, to report in the second period that its initial price was higher at $p_1^e = \hat{q}$ and then to charge period-2 consumers the price $p_2 = \theta\hat{q}$. (If θ is not too small, in the sense that if $\theta\hat{q} > q^{\text{lf}}$, this period-2 price is *above* the actual initial price.) Second-period consumers naively pay more than the product is really worth to them, and obtain negative surplus.

To illustrate, suppose that $c(q) = \frac{1}{2}q^2$ and $\sigma = \theta = \frac{1}{2}$, in which case $\hat{q} = 1$, $q^{\text{eff}} = \frac{3}{4}$ and $q^{\text{lf}} = \frac{1}{2}$. In the honest regime (i) we have $q = p_1 = \frac{3}{4}$ and $p_2 = \frac{3}{8}$, which is the efficient outcome. In environment (ii), the *laissez-faire* regime with sophisticated consumers, we have $q = p_1 = \frac{1}{2}$ and $p_2 = \frac{1}{4}$. In the *laissez-faire* regime with naive consumers, though, while quality and true initial price is still $q = p_1 = \frac{1}{2}$ the firm announces to second-period consumers that its initial price was 1 and charges these consumers $p_2 = \frac{1}{2}$. In regime (i) or (ii), the second-period price is half of the initial price, while in regime (iii) there is a false discount offered of 50% but in fact the "sale" price is precisely the same as the original price.

We summarise this discussion in the following result.

Proposition 2

(i) The firm will claim a proportional price discount in the second period equal to $1-\theta$*. This exaggerates the discount in the laissez-faire regime with naive consumers, but is truthful in the other two market environments.*

(ii) A change in regime from laissez-faire to honest will induce the firm to increase its product quality and its initial price, and total welfare (profit plus consumer surplus) rises. If second-period consumers are naive, the policy change increases their surplus.

(iii) In the laissez-faire regime, an education campaign which converts consumers from naive to sophisticated types has no impact on total welfare, but boosts consumer surplus.

The impact of a move to an honest regime on the seller's profit is described in Proposition 1 above, and the move helps the firm if uninformed consumers are sophisticated but harms the firm when they are naive.

In this model, the magnitude of the discount, $1-\theta$, is determined by our assumption that casual consumers who buy later have a lower willingness-to-pay than the keen consumers who buy early, and so intertemporal pricing reflects a simple form of third-degree price discrimination. A deeper implication of the model, though, is that consumers who buy later care about the firm's initial price, even though they are not able to buy the product at that price. Casual buyers know that keen buyers have a good understanding of product quality, and the firm is only able to sell to these buyers at a high price if the product has high quality.

This model assumes that the product offered to the two groups of consumers has the same quality. If the firm can manufacture a different, lower quality, product to supply the casual buyers, the ability for early price to signal quality is eliminated. Naive consumers may nevertheless believe they are getting a quality item in the sale. This phenomenon is sometimes alleged to occur when high-end clothing brands sell specially made lower quality clothing for sale only in out-of-town "outlet" stores.[12]

3.2 Clearance sales

Sellers will often discount their products to clear their shelves of unsold stock. The reason a particular product did not sell well is likely to be that early consumers did not think its perceived quality justified its price or because they found a better-value alternative elsewhere. As such, later consumers—if they are imperfectly informed about the product's quality or the market alternatives—will usually take the observation that the product did not sell to be "bad news". Plausibly, though, this news is less bad when the initial price was higher, since then even a reasonably desirable product might not have sold well. For

[12] For instance, US Senator Richard Blumenthal (and three others) wrote to the FTC on 30 January 2014: "some analysts estimate that upwards of 85% of the merchandise sold in outlet stores was manufactured exclusively for these stores. Outlet-specific merchandise is often of lower quality than goods sold at non-outlet retail locations. While some retailers use different brand names and labels to distinguish merchandise produced exclusively for outlets, other do not. This leaves consumers at a loss to determine the quality of outlet-store merchandise carrying brand-name labels. [...] we are concerned that outlet store consumers are being misled into believing they are purchasing products originally intended for sale at the regular retail store. [...] It is a common practice at outlet stores to advertise a retail price alongside the outlet store price—even on made-for-outlet merchandise that does not sell at regular retail locations. Since the item was never sold in the regular retail store or at the retail price, the retail price is impossible to substantiate." [See *www.blumenthal.senate.gov*.] As discussed in the introduction, Ngwe (2018) provides a detailed empirical study of one retailer's use of these tactics.

this reason, a consumer who encounters a product on sale might rationally care about the initial price as well as the current price.

Suppose for simplicity that a seller has a single unit of its product to sell over two periods and weights its profit from the two periods equally. There is one consumer who can buy only in the first period, and a second consumer who can buy only in the second period. There are several ways one might go on to specify the model in more detail. For instance, as in Bose *et al.* (2006), the product might have unknown quality which is exogenous to the firm, each consumer observes an exogenous and private signal of quality, and the second consumer also observes the endogenous signal that the first consumer did not wish to purchase the product. This endogenous signal is less informative when the initial price was high, and the second consumer is more likely to buy the product for a given private signal when she believes that the initial price was high.

However, perhaps the most direct way to model this situation is to modify Lazear's original model of a clearance sale. As in section 3.1, the first consumer is keen and accurately observes the product's quality q and is willing to pay up to q to buy this product. Unlike section 3.1, here the firm does not choose its quality and does not observe its quality, although it learns something about quality when its product does not sell in the first period. Suppose the prior probability that q is at least p is denoted $Q(p)$, a decreasing function. The second consumer is casual: she cannot observe q directly and is willing to pay θq for a product she believes has expected quality q. Write

$$\phi(p) \equiv \mathbb{E}[q \mid q \leq p]$$

for the expected quality conditional on quality being no greater than p, which is an increasing function of p. If the second buyer thinks the initial price was p_1^e, she infers that the expected quality if the item remains unsold is $\phi(p_1^e)$ and so is willing to pay up to $\theta\phi(p_1^e)$ for the product in the clearance sale. The resulting second-period price, $p_2 = \theta\phi(p_1^e)$, is below the (perceived) initial price p_1^e for two reasons: the second consumer values the product less than the first consumer (since $\theta \leq 1$) and, more importantly, the second consumer revises her value downwards when the item did not sell initially (since $\phi(p) < p$). If $p_1^e > p_1$, so that the second consumer believes the initial price was higher than was in fact the case, when $p_2 = \theta\phi(p_1^e)$ this consumer pays too much for the product and suffers a negative

expected surplus.

Suppose the firm's production cost for the single unit is normalized to zero. Then the firm's total profit if its true initial price is p_1, while the second consumer thinks the initial price was p_1^e, is

$$\Pi = p_1 Q(p_1) + \theta\phi(p_1^e)[1 - Q(p_1)] \ , \tag{3}$$

which takes the form (1). If the regime is honest (so $p_1^e \equiv p_1$), expression (3) becomes

$$\Pi = p_1 Q(p_1) + \theta\phi(p_1)[1 - Q(p_1)] \ , \tag{4}$$

and in this environment the firm chooses p_1 to maximize (4).

In environment (ii), a *laissez-faire* regime with a sophisticated consumer, the consumer does not observe but correctly anticipates the equilibrium initial price. That is to say, p_1^* is an equilibrium initial price in environment (ii) if

$$\text{setting } p_1 = p_1^* \text{ maximizes } p_1 Q(p_1) + \theta\phi(p_1^*)[1 - Q(p_1)] \ . \tag{5}$$

The following result collects together relevant features of this market environment:

Lemma 2 *In the laissez-faire regime with a sophisticated period-2 consumer:*

(i) an equilibrium initial price exists;

(ii) any such price is strictly below the equilibrium price in the honest regime;

(iii) the equilibrium initial price is unique if the density for q is logconcave.

Proof. (i) The price p_1^* is an equilibrium if it satisfies (5). In particular, choosing $p_1 = p_1^*$ must maximize $Q(p_1)[p_1 - \theta\phi(p_1^*)]$. Define $P(\cdot)$ to be the increasing function (assumed continuous) such that $P(c)$ maximizes $Q(p)(p - c)$ for a given marginal cost c. Then the equilibrium condition (5) is equivalent to

$$p_1^* = P(\theta\phi(p_1^*)) \ . \tag{6}$$

When $p_1^* = 0$, the left-hand side of (6) is below the right-hand side. When p_1^* is large, the right-hand side of (6) converges to $P(\theta\bar{q})$, where $\bar{q}$ is the unconditional mean of q, and this is lower than the left-hand side when p_1^* is large. Therefore, by continuity there exists a price p_1^* which satisfies (5).

(ii) Suppose that p_1^* is an equilibrium initial price, i.e., a price that satisfies (5). In the honest regime, where the firm's profit is (4), suppose the firm chooses a price $p_1 \leq p_1^*$. Then

$$\begin{aligned} p_1 Q(p_1) + \theta\phi(p_1)[1 - Q(p_1)] &\leq p_1 Q(p_1) + \theta\phi(p_1^*)[1 - Q(p_1)] \\ &\leq p_1^* Q(p_1^*) + \theta\phi(p_1^*)[1 - Q(p_1^*)] \ . \end{aligned}$$

Here, the first inequality follows from $\phi(\cdot)$ being an increasing function, while the second follows from (5). Thus, in the honest regime the firm is at least as well off choosing price p_1^* than any lower price. Using the property of p_1^* in (5), one can check that profits in (4) are locally strictly increasing in p_1 at p_1^*, given that ϕ is strictly increasing, and we deduce that the initial price in the honest regime is strictly higher than any equilibrium price in the *laissez-faire* regime with a sophisticated buyer.

(iii) We claim that if the density for q is logconcave, the right-hand side of (6) has slope less than one, which establishes the uniqueness of the solution to (6). First, the density of q being logconcave implies that the demand function $Q(\cdot)$ is logconcave, which in turn implies that there is less than complete cost pass-through in monopoly pricing, in the sense that the function $P(c)$ has slope less than 1. Second, when the density of q is logconcave, the function $1 - Q(\cdot)$ is also logconcave, and this in turn implies that the function $\phi(p)$ has slope less than 1.[13] Since $\theta \leq 1$, it follows that the right-hand side of (6) indeed has slope less than 1. ■

Finally, in environment (iii), the *laissez-faire* regime with a naive consumer, if the seller reports that its initial price was p_1^e the second consumer is willing to pay $\theta\phi(p_i^e)$ for the product on sale. Therefore, the seller would report a high initial price so that the second consumer does not downgrade her estimate of quality. This implies that the firm can charge $p_2 = \theta\bar{q}$ to the second buyer, where $\bar{q}$ is the unconditional mean of q, and its profit when it actually chooses initial price p_1 is

$$\Pi = p_1 Q(p_1) + \theta\bar{q}[1 - Q(p_1)] \ . \tag{7}$$

Comparing this expression with (5) implies that the firm chooses a higher initial price when it faces a naive consumer rather than a sophisticated consumer. Since the seller can extract

[13] See Bagnoli and Bergstrom (2005) for more details on some of these claims.

more profit from a naive consumer by manipulating her beliefs about quality, it has greater incentive to keep its product unsold until the second period. (Nevertheless, the firm does want sometimes to sell to the informed consumer in the first period.) A comparison of the optimal initial price in (7) with that for the honest regime is less clear-cut. However, when θ is close to 1 the initial price in the honest regime is sure to be higher.[14]

In each of the three environments the product is always sold to one of the consumers. However, if $\theta < 1$, it is more efficient to sell the product to the first than the second consumer. Since in any environment the first consumer buys if and only if $q \geq p_1$, it follows that total welfare in any environment is a decreasing function of the initial price p_1. Provided θ is not too small, the initial price is highest in the honest regime, which therefore achieves the lowest level of welfare. The requirement to reveal the initial price gives the firm an incentive to set a higher initial price in order to extract more revenue from the second consumer, and the product is then sold too infrequently to the high-value initial consumer.

To illustrate, consider the example where $Q(p) = 1 - p$, so that $\phi(p) = \frac{1}{2}p$, and $\theta = \frac{1}{2}$. In the honest regime (i) we have $p_1 = \frac{2}{3}$ and $p_2 = \frac{1}{6}$. In environment (ii), the *laissez-faire* regime with a sophisticated consumer, we have $p_1 = \frac{4}{7}$ and $p_2 = \frac{1}{7}$. In the *laissez-faire* regime with a naive consumer, the firm announces that its initial price was 1 and charges the second consumer price $p_2 = \frac{1}{4}$, while in fact its initial price was $p_1 = \frac{5}{8}$. Here, the initial price is highest in the honest regime, which is therefore the worst for welfare, while the *laissez-faire* regime with a sophisticated consumer is the most efficient of the three environments. In this example one can check that aggregate consumer surplus (not merely the surplus of the second consumer) is negative in the *laissez-faire* regime with a naive consumer, and so a move to the honest regime will benefit consumers in aggregate.

We summarise this discussion in the following result.

Proposition 3

(i) A change in regime from laissez-faire to honest will induce the firm to increase its

[14] When $\theta = 1$, one can check that expression (4) is monotonically increasing in p_1 until $Q(p_1) = 0$. When $\theta = 1$, therefore, in the honest regime the firm does not sell at all in the first period, which implies that the second consumer does not revise her beliefs about v downwards, and then extracts all the surplus from the uninformed second consumer. By contrast, when $\theta = 1$ the price that maximizes (7) is below the choke price for the demand function $Q(\cdot)$.

initial price (unless the second consumer is naive and θ is too small), which harms the first consumer and total welfare. A naive second-period consumer is better off with this policy change.
(ii) In the laissez-faire regime, an education campaign which converts the second-period consumer from a naive to a sophisticated type will induce the firm to reduce its initial price, which boosts total welfare and the surplus of both consumers.

Although the model here is superficially similar to that presented in section 3.1—both assume that later consumers cannot observe product quality, and in equilibrium these consumers use the initial price as a signal of quality—they have different policy implications. In section 3.1, a move to an honest regime improved efficiency and induced the firm to offer a higher quality, albeit more expensive, product. In the current model, though, a move to an honest regime induces a higher initial price without an accompanying rise in quality (which is out of the firm's control), and this harms overall welfare. However, while a ban on fictitious pricing has contrasting effects in these two models, a policy which converts naive consumers to sophisticates within a *laissez-faire* regime is beneficial for consumers in both models.

Rather than exaggerate its initial price, another fraudulent tactic a seller might use is to falsely claim that its product is new to the market. For instance, someone who is having difficulty selling their home may choose to "re-list" and thereby reset the property's apparent length of time on the market. Tucker *et al.* (2013) describe a new regulation in Massachusetts in 2006 which prevented this ability to re-list, and they found that slow-moving homes experienced a $16,000 reduction in sale price compared to nearby Rhode Island homes which were not subject to the regulation.

4 Conclusion

This paper has explored some economic effects of discount pricing. Although there are surely others, we suggested two reasons why a discounted price—as opposed to a merely low price—may make a rational consumer more willing to buy. First, the information that the product was initially sold at a high price may indicate that the firm chose to supply a high-quality product. Second, a higher initial price can indicate that the product's

exogenous quality, contingent on not selling well initially, is higher. We also discussed discount pricing with behavioural consumers, who exhibit reference-dependent preferences in the sense that they are more likely to buy a product at a given price if they believe that earlier consumers paid a higher price.

Three environments were considered: (i) an honest regulatory regime in which a firm's report of its past price was required to be truthful; (ii) a *laissez-faire* regime where a firm can make false claims about its earlier prices and sophisticated consumers understand that the firm is able to make such claims, and (iii) a *laissez-faire* regime with consumers who mistakenly believe the firm must be honest in its pricing claims. Because it faces fewest constraints on its pricing policy in (iii), but the tightest constraints in (ii), in our models the firm obtained greatest profits with (iii) and lowest profits with (ii). We saw that a regime change which requires honest price claims will cause the firm to raise its initial price: early consumers are "exploited" to deliver a larger discount to later buyers. In the model where the firm chooses its quality, a move from a *laissez-faire* to an honest regime enabled the firm to offer a more efficient level of quality, and if consumers were naive this policy shift also benefited them. In the model with exogenous but uncertain quality, the high initial price induced by the honest regulatory regime was harmful for welfare, although in an example the honest policy helps consumers in aggregate if they are naive.

This paper focused on one way a seller can deliver a bargain, which was to offer a discount on a previous price. There are other ways to give an impression of value-for-money, which could perhaps be analyzed along similar lines. For instance, a firm might offer a quantity discount, say of the form of "buy 3 books for the price of 2" in a bookstore. Such a tactic might reflect a more standard motive to discriminate between those who want a single book and those willing to buy more, alongside a desire to make a purchase appear a bargain. However, a common tactic is the more extreme "buy one, get one free", where it is harder to imagine a traditional price-discrimination motive.[15] (A devious version of this would be first to double the regular price, and then to stick a "2 for the price of 1"

[15] Jahedi (2016) experimentally investigates a situation where a seller offers two units of its product for little more than the price of one unit. He shows how consumers are *less* likely to buy two units when faced with the choice from {buy nothing, buy two units for \$1} than they are when faced with the larger choice set {buy nothing, buy one unit for \$0.97, buy two units for \$1}. Jahedi designs the experiments so that subjects know that prices have no signaling role (such as the signaling roles we analyze in our models), and suggests that some of his subjects have an intrinsic "taste for bargains".

label on, which keeps the unit price the same but adds the appearance of a bargain.)

Another motive to offer a bargain is if the firm "must sell". For instance, produce in a supermarket might be approaching its sell-by date, and the firm might offer a genuinely low price to get rid of its expiring stock. A label which states "must sell today" or a shop with a "closing down" sale sign, if credible, may induce consumers to buy without further search (or to buy in greater volume then they would do otherwise). Such a tactic could operate without any reference to a previous higher price. As usual, though, there is much scope for deception. Ehrlich (1990, page 43), in his account of the piano market in the nineteenth century, wrote: "Another common practice was the advertisement of new instruments as second hand for individual enforced sale by a 'recently bereaved widow' or 'gentleman about to emigrate'. Some were genuine bargains, others meretricious rubbish, deliberately assembled and falsely labelled to impress the gullible."

Yet another way to give the impression of value for money is to fool the buyer that he or she is the lucky recipient of an accidental discount. In his account of sales practices, Cialdini (2001, page 12) describes "the Drubeck brothers, Sid and Harry, who owned a men's tailor shop [...] in the 1930s. Whenever Sid had a new customer trying on suits in front of the shop's three-sided mirror, he would admit to a hearing problem and repeatedly request that the man speak more loudly to him. Once the customer had found a suit he liked and asked for the price, Sid would call to his brother, the head tailor, at the back of the room, 'Harry, how much for this suit?' Looking up from his work—and greatly exaggerating the suit's true price—Harry would call back, 'For that beautiful, all wool suit, forty-two dollars.' Pretending not to have heard and cupping his hand to his ear, Sid would ask again. Once more Harry would reply, 'Forty-two dollars.' At this point, Sid would turn to the customer and report, 'He says twenty-two dollars.' Many a man would hurry to buy the suit and scramble out of the shop with his [...] bargain before poor Sid discovered the 'mistake'."

Regulation might move from a *laissez-faire* to an honest regulatory regime by means of legal sanctions which act effectively to prohibit misleading price claims. Several jurisdictions have rules in place to combat deceptive pricing.[16] In the United States, the

[16]Some jurisdictions also have policies to prevent "permanent sales" by requiring all sales to occur on stipulated dates. Thus the summer sales in Paris in 2016 had to take place between 22 June and 2 August.

Federal Trade Commission's *Guides Against Deceptive Pricing* (para. 233.1) distinguishes between genuine and fictitious discounts. For instance, "where an artificial, inflated price was established for the purpose of enabling the subsequent offer of a large reduction - the 'bargain' being advertised is a false one; the purchaser is not receiving the unusual value he expects. In such a case, the 'reduced' price is, in reality, probably just the seller's regular price."

Nevertheless, as Rubin (2008) observes, in recent years there have been few attempts by the FTC to enforce its guidelines, although individual States sometimes do so.[17] Rubin suggests (page 172) that in part this is because the FTC "recognises that any advertising that stresses prices is likely to ultimately lead to lower prices". Rubin also suggests that most consumers are sophisticated and discount claims made by a firm about its prices at other times or in other outlets. However, even with sophisticated consumers there may be benefits in a move to an honest regime, if feasible; for instance, in our model where the initial price reflected the firms' product quality such a move helped a firm supply a higher level of quality. The observation that consumers are likely to be sophisticated is not enough on its own to rule out an honest regime as a desirable aim.

A major reason why regulators are often reluctant to combat deceptive pricing is that it is hard to enforce, or perhaps even coherently to formulate, effective policy towards misleading pricing. As Rubin (2008) notes, a basic problem is how to determine how few sales need to occur at the full price, or for how short a time the full price is available, for a sales campaign stating "was $200, now $100" to be classified as misleading.[18] Sellers have a strong motive to make their customers feel they are getting a special deal, and have myriad ways to achieve this. It may be as unrealistic and undesirable to suppose that regulation can address all forms of false discounting as it is, say, to forbid a sales assistant falsely claiming that a customer "looks good" in a particular item of clothing.

In any event, the potential benefit from policy which shifts from *laissez-faire* to an

[17] Ngwe (2018) discusses some very recent successful or ongoing legal cases in California against major department stores. He discusses recent cases in Illinois which were successfully defended by the retailers, due in large part to the difficulties in establishing economic harm suffered by consumers caused by fictitious pricing.

[18] Section 4 of the report by the Competition & Markets Authority (2015) describes current policy in the UK. For instance, one guideline is that a discount of the form "was £X, now £Y" should be displayed for no longer than the price £X was originally displayed.

honest regime can be realized only if it is effectively enforced. Indeed, as Rubin notes (page 174), and as with many kinds of consumer protection policy, weakly enforced policy may be worse than no policy. If consumers are under the impression that it is illegal for a firm to make misleading claims—perhaps as the result of one high-profile prosecution—they abandon their usual caution and act on these claims. If the policy is not in fact often enforced, consumers are thereby converted into "naive" types and environment (iii), arguably the worst case, is the outcome.[19]

An alternative approach might be for a regulator or consumer body to mount a publicity campaign which informs consumers that firms are in fact often able to present misleading claims without penalty. Such a policy, if effective, could convert naive consumers into sophisticated types and so move from environment (iii) to (ii). If it is simply too hard, except in the most flagrant cases, to combat deceptive pricing directly, the next best thing may be to alert consumers to the presence of fraudsters in many markets.

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[19] Nelson (1974, page 749) writes: "There is another source of deceptive advertising: the law. Whenever a law on advertising practices is moderately enforced, deceptive advertising is sure to occur. Take, for example, the law prohibiting the mislabeling of the fabric content of clothing. If that law is sufficiently enforced, consumers will believe that a clothing label is usually correct. This will provide an incentive for some manufacturer to mislabel".

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